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Iranian Journal of Medical Physics Open Access
Volume 16, Issue 2, 1 March 2019, Pages 166-170

Image quality and entrance surface dose evaluation of lateral cervical spine: A study using grid and non-grid techniques (Article)

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Abstract

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Introduction: The purpose of this study is to investigate the effects of grid and non-grid techniques in the lateral cervical spine radiography on image quality and entrance surface dose (ESD). Although image quality and radiation doses have been studied by researchers, there is still a dearth of information on image quality and patient dose with different techniques. Material and Methods: The radiographs of the lateral cervical spine were acquired by positioning the RANDO phantom abutting the erect bucky while using the grid and non-grid techniques. This study benefited from using a 24 cm x 30 cm Fuji standard cassette type imaging plate. A Leeds TOR test tool was utilized for relative comparison of image quality. The ESD of each examination was determined by using the optically stimulated luminescence dosimeter. Results: The increased kilovoltage (kVp) resulted in the reduction of ESD whether moving grid, stationary grid, or non-grid techniques were utilized. Significant differences in terms of contrast sensitivity and spatial resolution were indicated when comparing the grid technique to that of the non-grid technique (i.e., χ^2 =8 and 5, respectively $p < 0.05$). The results also indicated significant differences in ESD when using the moving grid, stationary grid, and non-grid techniques (i.e., χ^2 =7.2, $p < 0.05$). Conclusion: Significant differences in image quality and ESD were indicated when grid and non-grid techniques were used in the lateral cervical spine radiography. A non-grid with the highest appropriate kVp is recommended as the air gap acts as a grid, resulting in acceptable image quality with reduction in ESD. © 2019 Mashhad University of Medical Sciences.

Author keywords

Cervical vertebrae | Digital radiography | Image quality | Radiation dosage

ISSN: 1735160X
Source Type: Journal
Original language: English
DOI: 10.22038/ijmp.2018.33059.1400
Document Type: Article
Publisher: Mashhad University of Medical Sciences

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ISBN: 978-012404606-1; 978-012401717-7
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